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Anomala tingis, a new species related to *A. corrugata* Bates, 1866 from southern China (Coleoptera: Scarabaeidae: Rutelinae)

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Abstract: A new ruteline scarab beetle, *Anomala tingis* **sp. nov.**, is described based on material collected from three provinces in southern China. The only morphologically similar species, *A. corrugata* Bates, 1866, is compared, along with new geographic data. Color images and a distribution map are provided for both species.

Keywords: Leaf chafers, new record, new taxon, Scarabaeoidea, taxonomy

中国南部筛翅异丽金龟 *Anomala corrugata* Bates, 1866 一近缘新种——网翅异丽金龟 *Anomala tingis* sp. nov. (鞘翅目：金龟科：丽金龟亚科)

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摘要：本文描记一个采自中国南部的异丽金龟新种，即网翅异丽金龟 *Anomala tingis* **sp. nov.**，并与该新种在形态上已知的唯一近似物种筛翅异丽金龟 *A. corrugata* Bates, 1866 进行了对比，同时增加了后者的地理分布范围，提供了二者的形态图和分布图。

关键词：丽金龟，新纪录，新分类单元，金龟总科，分类学

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Introduction

The genus *Anomala* Samouelle, 1819 is amongst the most diverse genera in the tribe Anomalini Streubel, 1839 and in the subfamily Rutelinae Macleay, 1819 with over 1000 recorded taxa (Krajčík 2007). It also counts about half of the known diversity of Chinese leaf chafer (Lu *et al.* 2023). Compared to the similar genera *Callistethus* Blanchard, 1851 and *Mimela* Kirby, 1823, *Anomala* species are typically characterized by the absence of ventral thoracic processes. Since such processes evolved independently in various Anomalina groups (Zorn 2011; Filippini *et al*. 2015), to simply rely on these character states makes *Anomala* a non-monophyletic entity (Jameson *et al.* 2003; Ramírez-Ponce & Morón 2009).

Anomala corrugata Bates, 1866 is an enigmatic species from southeastern China. The dorsal surface bears extensive large punctures, and the body shape is ovoid, with elytra widest near apex, whereas widest around middle in most *Anomala* species. Machatschke (1957) grouped *A. corrugata* with *A. viridicostata* Nonfried, 1892. The latter, however, is a member of the *A. spiloptera*-group (sensu Zorn *et al.* 2017) whose parameres are dorsobasally connected by a broad membrane. The sculpture and body shape reminds the author of some *Mimela* species, e.g. *M. holosericea* (Fabricius, 1787), *M. sericea* Ohaus, 1905, and *M. yonaguniensis* Nomura, 1965 despite the missing prosternal process. So far, there seems no related species of it within the genus *Anomala*.

In recent years, the author identified a species morphologically similar to *A. corrugata* among material collected from southern China. After a careful study, it was proved to be new to science and is described here.

Material and methods

The examination and dissection of specimens, preparation of color plates, and the treatment of labels follow that of Zhao *et al.* (2024). Specimens quoted in the present paper are deposited in the following public or personal collections:

AHNU Anhui Normal University, Wuhu, China;
MNHN Muséum national d'Histoire naturelle, Paris, France;
NMPC National Museum, Praha, Czech Republic;
SCAU South China Agricultural University, Guangzhou, China;
SYSU The Museum of Biology, Sun Yat-sen University, Guangzhou, China;
CCPC Chang-Chin Chen personal collection, Tianjin, China;
CZPC Carsten Zorn personal collection, Gnoien, Germany;
SJPC Stanislav Jákl personal collection, Praha, Czech Republic;
TZPC Zhao-Yang Tang personal collection, Shenzhen, China;
ZMPC Ming-Zhi Zhao personal collection, Zhuhai, China.

Taxonomy

Anomala tingis sp. nov. 网翅异丽金龟

https://zoobank.org/81477275-A366-473C-9DCC-9890E2FCE497
Figs 1–2, 4–6, 10

Type material. HOLOTYPE. ♂ (SCAU) "CHINA: Guangxi, Fangchenggang City, Naliang Town, Tansan Village [滩散村], 325 m, 2023.IV.17–22, Le Liang leg.". **PARATYPES** (21♂, 27♀)**. Guangxi:** 2♂ (TZPC) "CHINA: Guangxi, Fangchenggang City, Naliang Town, Tansan Village, 325 m, 2023.IV.17–22, Le Liang leg."; 2♂, 1♀ (ZMPC) "CHINA: Guangxi, Fangchenggang City, Naliang Town, Tansan Village, 325 m, 2023.IV.17–22, Le Liang leg."; 1♀ (ZMPC) "CHINA: Guangxi, Fangchenggang City, Naliang Town, Tansan Village, 325 m, 2023.IV.26, local leg."; 1♀ (TZPC) "CHINA: Guangxi, Fangchenggang City, Naliang Town, Tansan Village, 325 m, 2023.V.1, local leg."; 1♀ (ZMPC)

"CHINA: Guangxi, Fangchenggang City, Naliang Town, Tansan Village, 325 m, 2023.V.2, local leg."; 2♀ (TZPC) "CHINA: Guangxi, Fangchenggang City, Naliang Town, Tansan Village, 325 m, 2023.V.6, local leg."; 1♂, 1♀ (TZPC) "CHINA: Guangxi, Fangchenggang City, Naliang Town, Tansan Village, 325 m, 2023.V.7, local leg."; 2♀ (TZPC) "CHINA: Guangxi, Fangchenggang City, Naliang Town, Tansan Village, 325 m, 2023.V.11, local leg."; 1♀ (ZMPC) "CHINA: Guangxi, Fangchenggang City, Naliang Town, Tansan Village, 325 m, 2023.V.14, local leg."; 1♀ (ZMPC) "CHINA: Guangxi, Fangchenggang City, Naliang Town, Tansan Village, 325 m, 2023.V.15, local leg."; 1♂ (ZMPC) "CHINA: Guangxi, Fangchenggang City, Naliang Town, Tansan Village, 325 m, 2023.V.19, local leg."; 1♂, 1♀ (TZPC) "CHINA: Guangxi, Fangchenggang City, Naliang Town, Tansan Village, 325 m, 2023.V.20, local leg."; 1♂, 1♀ (ZMPC) "CHINA: Guangxi, Fangchenggang City, Naliang Town, Tansan Village, 325 m, 2023.V.28, local leg."; 2♂, 1♀ (ZMPC) "CHINA: Guangxi, Fangchenggang City, Naliang Town, Tansan Village, 325 m, 2023.V.30, local leg."; 1♂ (ZMPC) "CHINA: Guangxi, Shangsi, Shiwandashan Mts. 495 m, 2019.IV.19, at light, Bo-Yan Li leg."; 2♀ (ZMPC) "CHINA: Guangxi, Shangsi, Shiwandashan Mts. 434 m, 2019.IV.21, at light, Bo-Yan Li leg."; **Guangdong:** 1♂ (SYSU) "Guangdong, Fengkai, Heishiding light trap 2.VI.2011 Mu-Chun Cheng, Jun-Lei Liao leg."; 1♀ (SYSU) "Guangdong, Fengkai, He'erkou [河儿口] 2010-v-8 light trap Hai-Dong Chen, Hong-Sheng Wu, Yong-Jun Li, Hong Pang leg."; **Hainan:** 1♂ (CCPC) "Hainan, Mt. Limushan, Mengxiantu [梦仙图] 800/m 23.IV.2009 Xiao-Yu Zhu leg."; 1♀ (CCPC) "Hainan, Mt. Limushan, Mengxiantu 800/m 27.IV.2009 Xiao-Yu Zhu leg."; 2♂ (ZMPC) "CHINA-Hainan, Mt. Limushan, Sanquling [三曲岭], 600 m, 2022.IV.23 Yu-Cheng Zheng leg."; 1♀ (ZMPC) "CHINA: Hainan, Qiongzhong, Mt. Limu, 19.16996908N, 109.74695635E 627 m, 2024.IV.8-13, at light, Yu-Zhou Huang, Xiao-Han Ye, Ze-Chuan Li leg."; 1♂, 8♀ (ZMPC) "CHINA: Hainan, Lingshui, Mt. Diaoluo, 18.72268866N, 109.78222715E 925 m, 2024.IV.14-15, at light, Yu-Zhou Huang, Xiao-Han Ye, Ze-Chuan Li leg.".

Description. Male. Body shape elongated ovoid, moderately convex.

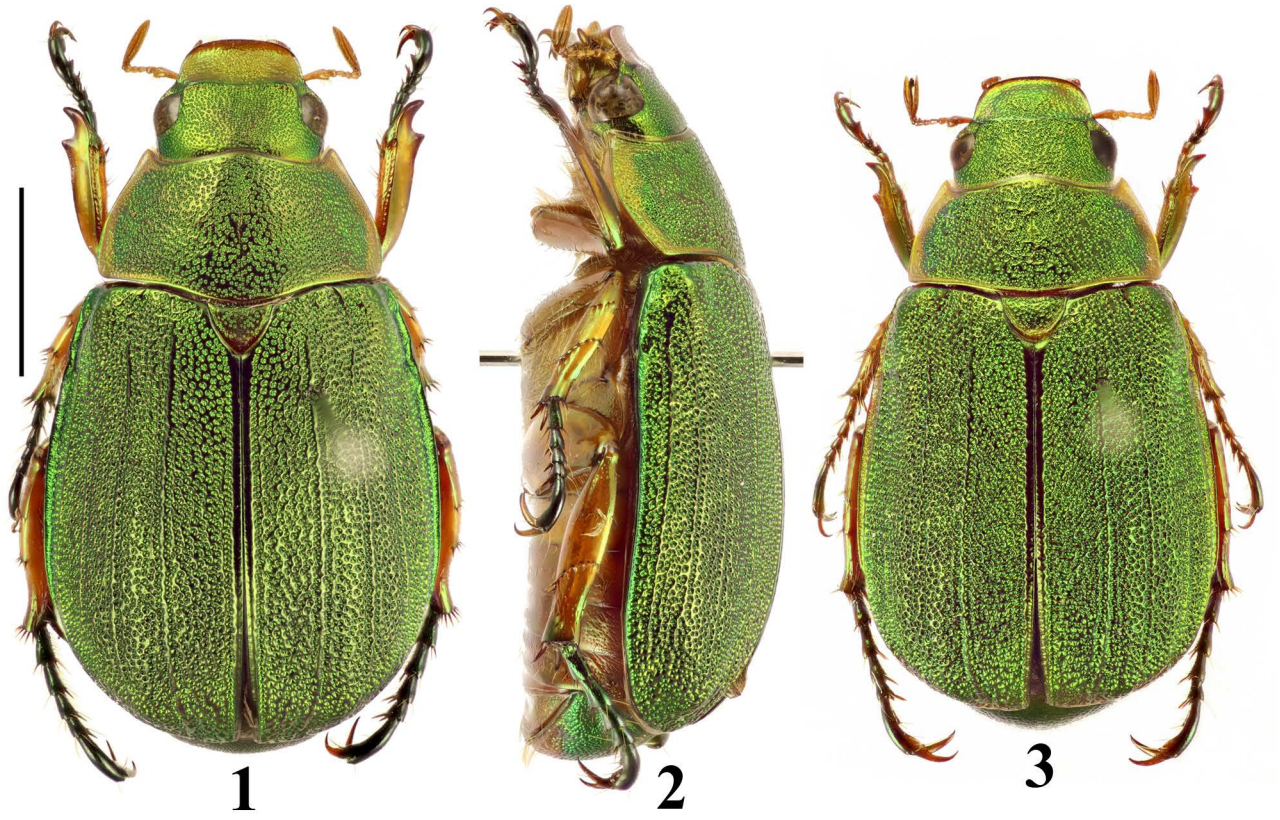
Color. Generally yellowish brown, frontoclypeal suture, eye canthus, frons (except for very narrow anterior portion), vertex, disc of pronotum (except for narrow anterior and posterior and wide lateral marginal portions), scutellum, elytra, pygidium (except for posterior marginal portions) and all tibiae grass green; dorsal surface and tibiae metallic; protibial teeth, all robust setae on legs dark brown.

Head. Labrum weakly produced under ventral margin of clypeus. Frontal face of clypeus vertical, with minute setae along its ventral margin and on lateral portions. Greatest length/width of clypeus = 1/2.7, subtrapezoidal, anterior margin nearly straight, anterior corners rounded; anterior margin moderately reflexed; surface densely and finely rugopunctate. Frontoclypeal suture straight, hardly elevated. Frons with dense and large, irregularly arranged and confluent punctures, vertex with dense and small punctures. Interocular distance/maximum head width = 0.7. Length of antennal club approximately 0.7 times as long as combined length of antennomeres 1–6. Inner margin of eye with several moderately long setae.

***Pronotum*.** Sides gently arched and weakly convergent anteriad in posterior half, straight and strongly convergent anteriad in anterior half. Anterior angle acute and protruding, posterior angle broadly rounded and not protruding. Anterior and posterior marginal line broadly interrupted in the middle, lateral marginal lines complete. Disc with very dense and large punctures, irregularly arranged and frequently connected, interspace between punctures raised and irregular. Lateral margin with a few long setae.

Scutellum triangular, sides slightly convex. Glabrous, disc with dense and small punctures, as well as microsculpture.

Elytra. The whole disc bearing very dense and large punctures, punctures near humeral protuberance small; intervals unrecognizable, each elytron bearing five slightly elevated and smooth costae from suture to lateral portion, costa 4 absent in basal third, space between costae 1 and 2 widest, other costae equally spaced. Humeral and apical protuberances moderately prominent. Lateral carina distinctly expanded in basal four fifths, widest along metacoxa, with dense, fine and transverse striolation. Epipleura with a row of rather sparse and minute setae, denser near base. Marginal membrane broad, appearing slightly behind the anterior margin of metacoxa.



FIGURES 1–3. Habitus of *Anomala* spp.: **1, 2** *A. tingis* **sp. nov.** holotype male, in dorsal and lateral views **3** *A. corrugata* male (Fujian, Puchanshan), in dorsal view. Scale bar = 5 mm.

FIGURES 4–9. Aedeagus of *Anomala* spp. in dorsal, right lateral and ventral views: **4–6** *A. tingis* **sp. nov.** holotype **7–9** *A. corrugata* (Fujian, Puchanshan). Scale bar = 2 mm.

Abdomen. Propygidium hidden by elytra. Pygidium weakly convex in lateral view, surface with dense punctures, interspaces with rather dense and fine microsculpture, with sparse and long setae preapically and a transverse row along apical margin. Abdominal ventrites not carinate laterally, punctures sparse and transverse, more rounded and denser laterally; ventrites 2–5 each with a transverse and sparse row of short setae, long along midline, the row of ventrite 6 present at posterior margin and with long setae.

Ventral thoracic surface. Hypomeron with sparse, large and annulated punctures each bearing a short seta. Ventral mesothoracic surface with dense, transverse and small punctures each bearing a minute and recumbent seta. Ventral metathoracic surface with dense, large and shallow annulated punctures, sometimes confluent laterally, with dense and long setae, medial portions with rather sparse and small punctures as well as few minute setae. Metacoxae punctate as lateral metasternum but glabrous.

Legs. Protibia bidentate, both teeth distinct; apical tooth extending to anterior margin of protarsomere 2. Inner spur inserted at distal third of protibia. Inner protarsal claw and outer mesotarsal claw split apically, lower branch three times wider than upper branch in protarsal claw and two times in mesotarsal claw, both branches equal in length; lower margin of lower branch of inner protarsal claw not convex, forming a notch internobasally; outer metatarsal claw slightly longer than inner one. Each tarsomere 5 with an internomedial denticle, that of mesotarsomere 5 smaller. Ventral surface of mesofemur with two longitudinal rows of short to long setae, with additional long setae between the two rows; meso- and metatibiae each bearing two oblique groups of robust setae emerging from a carina, basal fourth with a few fine setae.

Male genitalia. Parameres symmetric, glabrous, narrower at apical half. Ventral plate with a truncate and deflected apical margin.

Female. Antennal club slightly shorter. Pygidium more triangular in shape. Apical protibial tooth longer and wider, extending to anterior margin of protarsomere 3, proximal tooth right-angled; inner spur inserted at mid-length of protibia; internomedial protuberance of 5th protarsomere small; protarsomeres distinctly thinner, lower branch of inner protarsal claw two times wider than upper branch, not forming a notch internobasally. Ultimate abdominal ventrite 1.5 times longer than in male medially.

Measurements. Body length: 16.8–18.7 mm for male (holotype 17.1 mm) and 14.7–18.4 mm for female, greatest width: 9.5–10.2 mm for male (holotype 9.7 mm) and 9.2–10.4 mm for female.

Differential diagnosis. *Anomala tingis* **sp. nov.** is closely allied to *A. corrugata* Bates, 1866. However, the male of the new species has wider tibiae, and the punctures on the dorsal surface are overall more regular than those of *A. corrugata*. Additionally, they can be distinguished by the shape of parameres in lateral view: those of *A. tingis* are narrower in apical half, the apex is more acute, and the ventral concavity is deeper than in *A. corrugata*.

Etymology. *Tingis* is the type genus of the lace bugs, Tingidae. The name is used here as a noun in apposition, referring to the similar dorsal sculpture.

Distribution. China: Guangdong, Guangxi, Hainan.

Anomala corrugata Bates, 1866 筛翅异丽金龟

Figs 3, 7–9, 10

Anomala corrugata Bates, 1866: 343 [type locality: “Formosa”]; Yu *et al.* 1998: 119, 199, pl. 13, fig. 3; Lu & Bai 2020: 104, pl. IX, fig. 9.

Anomala holosericioides Niijima & Kinoshita, 1927: 85, pl. II, fig. 11, pl. III, fig. 9 [type locality: “Formosa: Taihoku”, currently Taipei]; Kobayashi 1984: 17, fig. 2; Yu *et al.* 1998: 199 [synonym]; Lin 2002: 398, fig. 27-565 [record from Fujian, Guangdong, Guangxi].

Type material. 2♂, 2♀ (MNHN) syntypes of *A. corrugata* from Formosa, examined through photos.

Additional material. CHINA: Anhui: 2♂, 2♀ (AHNU) Anhui Prov., Huangshan City, Jiulongfeng [九龙峰],

30.12464359°N, 118.02228679°E, 309 m, 2024.V.22, leg. Hai-Feng Xu, Zafar; **Fujian:** 27♂, 5♀ (CZPC, NMPC) China: Fujian Province, Wuyishan Mts. NNR, Sangang vill. env., 24.V. – 3.VI.2016, 27°45.0'N, 117°40.7'E, 720 m, river valley, wet rock along road, J. Hájek, D. Král, J. Růžička & L. Sekerka lgt.; 1♂ (ZMPC) Fujian, Sanming, Puchan Mt. [普禅山], 2015-VI-30, Zhi-Hao Qi, Zheng Shi leg.; **Guangdong:** 6♂, 3♀ (SYSU) Kwangtung, S. China Taam Yuen Tung [潭源洞] Lin-hsien (District) May 25, 1934. F. K. To; 6♂, 6♀ (SYSU) Kwangtung, S. China Taam Yuen Tung Lin-hsien (District) June 1, 1934. F. K. To; 1♂ (ZMPC) Guangdong, Shixing, Chebaling, 1990.IV.19, Xing Su leg.; **Guangxi:** 5♂, 4♀ (CZPC, SJPC) China, Guangxi, 1200m, Dayao Shan, SE Luzhou, 23°45'N 109°45'E, VI.2005, V. Siniaev leg.; 1♂ (CCPC) Guangxi, Guilin City, Xing'an County, Gaozhai [高寨], 500-600 m, 2013.V.21-23, Y.-F. Hsu leg.; 2♂ (SYSU) Guangxi, Guilin, Maoershan, Tongren-Jiuniutang-Sanjiangyuan [同仁-九牛塘-三江源], top of the mountain, 350-1180-2100 m, 2004.IV.29–V.4, Chun-Tian Zhang; **Hunan:** 1♀ (ZMPC) CHINA: Hunan Prov. Chenzhou City, Guidong Co., Baoxia Vill. [堡下村] 2023.V.21 25° 51′ 50″ N, 113° 51′ 40″ E HID light trap, Sun-Bin Huang; **Jiangxi:** 51 ex (SYSU) Jiangxi, Jinggangshan, Xiangzhou [湘洲], 2011-V-31, Li-Jun Yang, Jing-Wei Li leg.; **Zhejiang:** 1♂ (ZMPC) Zhejiang, Jiangshan City, Shuangxikou [双溪口] 400-650 m Xin-Ran Li, Li-Li Wang, Meng Li 2017.5.26-27; 51 ex (ZMPC) Zhejiang, Lishui, Jingning County, 2017.VII.12, light trap, Jing-Kun Zhang leg.

Remarks. *Anomala corrugata* was previously misidentified by Nomura (1965) and Kobayashi (1984). The Japanese name "タイワンサクラコガネ" (Taiwan Sakurakogane) quoted by the two authors refers to *A. siniopyga* Ohaus, 1917 as clarified by Yu *et al.* (1998). Yu *et al.* (1998) also denoted that Miyake *et al.* (1991) synonymized *A. holosericioides* with *A. corrugata*. However, this taxonomic act is not explicitly stated in the work of Miyake *et al.*, where only a misidentification of *A. corrugata* had been discussed. Therefore, Yu *et al.* (1998) represents the first formal treatment of the synonymization. The male genitalia of *A. holosericioides* illustrated by Niijima & Kinoshita (1927) correspond to that of *A. corrugata* from continent, which is further evidence.

Lin (2002) reported this species from Guangdong and Guangxi without specifying precise localities, where both *A. tingis* and *A. corrugata* are presented. The material examined in this paper clarifies the distribution of *A. corrugata* in these two provinces and newly extends its known range to four additional provinces.

Distribution. China: Anhui*, Fujian, Guangdong, Guangxi, Hunan*, Jiangxi*, Taiwan, Zhejiang* (new record each with an asterisk).

FIGURE 10. Map of southeastern China showing the approximate known distribution of *Anomala tingis* **sp. nov.** (blue star) and *A. corrugata* (red triangle).

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Additional information

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